

ABSTRACT OF THE DISCLOSURE

A CVD Method of forming gate dielectric thin films on a substrate using metalloamide

compounds of the formula $M(NR^1R^2)_x$, or $M \left[\begin{array}{c} \text{CH}_2 \\ \diagup \quad \diagdown \\ \text{N} \\ \diagdown \quad \diagup \\ \text{CH}_2 \end{array} (CH_2)_n \right]_x$, wherein M is Zr, Hf, Y, La, Lanthanide series elements, Ta, Ti, or Al; N is nitrogen; each of R^1 and R^2 is same or different and is independently selected from H, aryl, perfluoroaryl, C_1 - C_8 alkyl, C_1 - C_8 perfluoroalkyl, alkylsilyl; and x is the oxidation state on metal M; and an aminosilane compound of the formula

$H_xSiA_y(NR^1R^2)_{4-x-y}$ or $H_xSiA_y \left[\begin{array}{c} \text{CH}_2 \\ \diagup \quad \diagdown \\ \text{N} \\ \diagdown \quad \diagup \\ \text{CH}_2 \end{array} (CH_2)_n \right]_{4-x-y}$

wherein H is hydrogen; x is from 0 to 3; Si is silicon; A is a halogen; Y is from 0 to 3; N is nitrogen; each of R^1 and R^2 is same or different and is independently selected from the group consisting of H, aryl, perfluoroaryl, C_1 - C_8 alkyl, and C_1 - C_8 perfluoroalkyl; and n is from 1-6. By comparison with the standard SiO_2 gate dielectric materials, these gate dielectric materials provide low levels of carbon and halide impurity.